

**Amendment to the Claims**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

**Claims 1-20 (cancelled)**

**Claim 21 (new):** An autocorrelator apparatus comprising:

- a broadband light source;
- a first single mode optical fiber adapted to optically connect the broadband light source to a multi-port passive device;
- a second single mode optical fiber adapted to optically connect the multi-port passive device to a fiber light probe wherein the fiber light probe is adapted to emit a first broadband light beam and is adapted to receive a second broadband light beam;
- a third single mode optical fiber adapted to optically connect the multi-port passive device to a first single mode fiber coupler;
- a fourth single mode optical fiber having a path length, the fourth single mode optical fiber adapted to optically connect the first single mode fiber coupler to a first Faraday rotator mirror wherein the fourth single mode optical fiber is wound onto a first piezoelectric fiber stretcher for varying the optical path length of the fourth single mode optical fiber;
- a fifth single mode optical fiber having a path length substantially equal to the path length of the fourth single mode optical fiber, the fifth single mode optical fiber adapted to optically connect the first single mode fiber coupler to a second Faraday rotator mirror; and
- a sixth single mode optical fiber adapted to optically connect the first single mode fiber coupler to a receiver having processing electronics wherein the second broadband light beam received by said fiber light probe and a signal representative of the variation in broadband light path length of said fourth optical fiber as interfered with broadband light from the fifth optical fiber are processed to produce therefrom indications of a displacement of reflections of the first broadband light beam emitted from said fiber light probe.

**Claim 22 (new):** An autocorrelator apparatus of claim 21 wherein the multi-port passive device is a second single mode fiber coupler.

**Claim 23 (new):** An autocorrelator apparatus of claim 21 wherein the multi-port passive device is a three-port circulator.

**Claim 24 (new):** An autocorrelator apparatus of claim 21 wherein the fifth single mode optical fiber is wound onto a second piezoelectric fiber stretcher for varying the optical path length of the fifth single mode optical fiber.

**Claim 25 (new):** An autocorrelator apparatus of claim 21 wherein the second broadband light beam is comprised of a reflection of the first broadband light beam.

**Claim 26 (new):** An autocorrelator apparatus of claim 21 wherein the second broadband light beam is comprised of a reflection of the first broadband light beam reflected from a sample under test.

**Claim 27 (new):** An autocorrelator apparatus comprising:

- a broadband light source;
- a first single mode optical fiber adapted to optically connect the broadband light source to a first fiber light probe wherein the first fiber light probe is adapted to emit a first broadband light beam;
- a second single mode optical fiber adapted to optically connect a second fiber light probe to a single mode fiber coupler wherein the second fiber light probe is adapted to receive a second broadband light beam;
- a third single mode optical fiber having a path length, the third single mode optical fiber adapted to optically connect the single mode fiber coupler to a first Faraday rotator mirror wherein the third single mode optical fiber is wound onto a first piezoelectric fiber stretcher for varying the optical path length of the third single mode optical fiber;

- a fourth single mode optical fiber having a path length substantially equal to the path length of the third single mode optical fiber, the fourth single mode optical fiber adapted to optically connect the single mode fiber coupler to a second Faraday rotator mirror; and
- a fifth single mode optical fiber adapted to optically connect the single mode fiber coupler to a receiver having processing electronics wherein the second broadband light received by said second fiber light probe and a signal representative of the variation in broadband light path length of said third optical fiber as interfered with broadband light from the fourth optical fiber are processed to produce therefrom indications of a displacement of reflections of the first broadband light beam emitted from said first fiber light probe.

**Claim 28 (new):** An autocorrelator apparatus of claim 27 wherein the fourth single mode optical fiber is wound onto a second piezoelectric fiber stretcher for varying the optical path length of the fourth single mode optical fiber.

**Claim 29(new):** An autocorrelator apparatus of claim 27 wherein the second broadband light beam is comprised of a reflection of the first broadband light beam.

**Claim 30(new):** An autocorrelator apparatus of claim 27 wherein the second broadband light beam is comprised of a reflection of the first broadband light beam reflected from a sample under test.

**Claim 31(new):** An autocorrelator apparatus comprising:

- a broadband light source adapted to produce broadband light having a center frequency operating at a first wavelength;
- a first single mode optical fiber adapted to optically connect the broadband light source to a multi-port passive device;

- a second single mode optical fiber adapted to optically connect the multi-port passive device to a fiber light probe wherein the fiber light probe is adapted to emit a first broadband light beam and the fiber light probe is adapted to receive a second broadband light beam;
- a third single mode optical fiber adapted to optically connect the multi-port passive device to a combining coupler;
- a coherent light source adapted to produce coherent light operating at a second wavelength;
- a fourth single mode optical fiber adapted to optically connect the coherent light source to the combining coupler;
- a fifth single mode optical fiber adapted to optically connect the combining coupler to a first single mode fiber coupler;
- a sixth single mode optical fiber having a path length, the sixth single mode optical fiber adapted to optically connect the first single mode fiber coupler to a first Faraday rotator mirror wherein the sixth single mode optical fiber is wound onto a first piezoelectric fiber stretcher for varying the optical path length of the sixth single mode optical fiber and having a first sweep;
- a seventh single mode optical fiber, having a path length substantially equal to the path length of the sixth single mode optical fiber, the seventh single mode optical fiber adapted to optically connect the first single mode fiber coupler to a second Faraday rotator mirror wherein the seventh single mode optical fiber is wound onto a second piezoelectric fiber stretcher for varying the optical path length of the seventh single mode optical fiber and having a second sweep, and wherein the second piezoelectric fiber stretcher is driven opposite from the first piezoelectric fiber stretcher;
- an eighth single mode optical fiber adapted to optically connect the first single mode fiber coupler to a splitter and filter assembly;
- a ninth single mode optical fiber adapted to optically connect the splitter and filter assembly to a first optical receiver adapted to receive light from the second broadband light beam at the first wavelength received via said fiber light probe

having optical interference related to a combination of the first sweep and the second sweep; and

a tenth single mode optical fiber adapted to optically connect the splitter and filter assembly to a second optical receiver wherein the second optical receiver is adapted to detect fringe variations of the coherent light source at the second wavelength to determine the displacement of a combined scan resulting from a combination of the first sweep and the second sweep.

**Claim 32 (new):** An autocorrelator apparatus of claim 31 wherein the multi-port passive device is a second single mode fiber coupler.

**Claim 33 (new):** An autocorrelator apparatus of claim 31 wherein the multi-port passive device is a three-port circulator.

**Claim 34 (new):** An autocorrelator apparatus of claim 31 wherein the combining coupler is a wavelength division multiplexer

**Claim 35 (new):** An autocorrelator apparatus of claim 31 wherein the splitter and filter assembly is a wavelength division multiplexer

**Claim 36 (new):** An autocorrelator apparatus of claim 31 wherein the second broadband light beam is comprised of a reflection of the first broadband light beam.

**Claim 37 (new):** An autocorrelator apparatus of claim 31 wherein the second broadband light beam is comprised of a reflection of the first broadband light beam reflected from a sample under test.

**Claim 38 (new):** An autocorrelator apparatus of claim 31 wherein the wavelength of the coherent light source is within 25% of the center wavelength of the broadband light source.